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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,555	12/28/2005	Attilio Bragheri	05788.0340	8609

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EXAMINER
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BOLDA, ERIC L

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 07/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/522,555

Applicant(s)

BRAGHERI ET AL.

Examiner

Eric Boldt

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 20-38 is/are pending in the application.
- 4a) Of the above claim(s) 28-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 20-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1/27/2005</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election with traverse of species Group IA, in the reply filed on May 22, 2006 is acknowledged. The traversal is on the ground(s) that species are improperly divided into groupings of claims. This is not found persuasive because the Examiner made a Lack of Unity restriction under PCT rule 13.1, whereas the Applicant's argument is relevant to restriction under 35 U.S.C. 121. The restriction was necessitated by the fact that the groups lack the same special technical feature that defines a contribution over the prior art (see form PCT/IPEA210 and Freeman et al., WO 02/058198). Applicant further argues that claims 24-26 belong to group IA. This is found persuasive. Claims 20-27 read on the elected species.

The requirement is still deemed proper and is therefore made FINAL.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 24 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 24 recites the limitation "first and second group of frequencies" in lines 1-2, and claim 26 recites the limitation "first group of frequencies" and "second group of frequencies". There is insufficient antecedent basis for this limitation in the claim (claim 20 recites first group of *pump* frequencies, etc.).

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claims 20-23 rejected under 35 U.S.C. 102(a) as being anticipated by Wang (US Pat. App. Pub. No. 2002/0149838.)

With regard to claims 20-23, Wang discloses in Fig. 6 a optical amplification system comprising groups of Raman amplifiers. Each group consists of two amplifiers Bi and Ci in series. A signal is introduced into the optical fiber path; the optical fiber comprises a series of Raman-active materials with a predetermined Raman shift (para. [0009]). A first set of pump lights are introduced into amplifier stage Bi and a second set of pump lights are introduced into amplifier stage Ci. As shown in Fig. 7B, and claim 6, the wavelengths (equivalent to specifying frequencies ) of the first pump lights are different from the wavelengths of the second pump lights. The total range of the first and second group of pump wavelengths has a width of approx. 120 nm, which is more than 40% of the Raman shift which is about 100 nm (see para. [0050]). It is inherent in the method of operating the optical amplification system of Wang that the residual power of the second pump light entering the first amplifier has a power much lower (10dB or 13dB) than than the first pump light entering the first amplifier, and the residual power of the first pump light entering the second amplifier has a much lower (10dB or 13dB) lower than than the second pump light entering the second amplifier. This is because

Art Unit: 3663

the intent is for the gain profiles of the first and second amplifiers to be superposed, which would not be the case if residual pump light from one amplifier stage were leaking into a different amplifier stage. The difference between the maximum and minimum pump wavelength of each amplifier stage is dependent on the range of signals to be amplified, and is as small as 20 nm (see claim 6), less than 50% of the Raman shift equal to 100nm.

With regard to claim 25, the range of at least one of the first and second group of pump wavelengths has a width of at least 60 nm, which is more than 20% of the Raman shift .

With regard to claim 27, the pumping light is supplied by a plurality of pump lasers, the variation in pump power emission being at most 50% of the average pump power emission (see Figs. 7A-B).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

Art Unit: 3663

3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang as applied to claims 20-23 above and further in view of Hainberger (US Pat. No. 7,054,060). Wang discloses all elements of the claim except that the first and second group of pump frequencies do not overlap each other. However, Hainberger illustrate in Fig. 13, or alternatively in Fig. 31, two non-overlapping groups of pump frequencies,  $P_{IF}$  and  $P_{OB}$  corresponding to copropagating and counterpropagating pumps coupled to a Raman amplifying fiber. It would have been obvious to one skilled in the art (e. g. an optical engineer) to configure the pump frequencies as in Hainberger, in the optical amplification method of Wang, for the purpose of avoiding four-wave mixing in the signal band.

8. With regard to claim 26, Wang discloses all elements of the claim except that first group of pump frequencies Raman amplifies a first portion of the optical signal, the second group of pump frequencies Raman amplifies a second portion of the optical signal, the first portion of the optical signal having a greater attenuation vs. wavelength (slope) in said Raman active material than the second portion. However, Hainberger discloses in Fig. 13 the two groups of pump frequencies chosen to amplify two different optical signal portions. As is evident from the Raman gain profile Fig. 1, the first (lower) portion of the optical signal will have a greater attenuation versus wavelength in the Raman amplifying material than the second portion. It would have been obvious to one skilled in the art (e. g. an optical engineer) to configure the pump frequencies as in

Hainberger, in the optical amplification method of Wang, for the purpose of avoiding four-wave mixing in the signal band.

Note that the citations made herein are done so for the convenience of the applicant; they are in no way intended to be limiting. The prior art should be considered in its entirety.

***Information Disclosure Statement***

9. The information disclosure statement filed on Jan. 27, 2005 has been considered by the Examiner.

***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Carniel and Hamoir disclose Raman amplifiers with pump arrays.

11. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Eric Bolda whose telephone number is 571-272-8104. The examiner can normally be reached on M-F from 8:30am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Jack Keith, can be reached on 571-272-6878. Please note the fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Art Unit: 3663

Status information for unpublished applications is available through Private PAIR only.

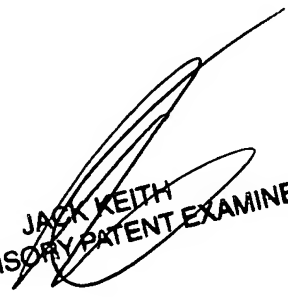
For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

En

Eric Boldt

  
JACK KEITH  
SUPERVISORY PATENT EXAMINER